

Power Supply Overvoltage Category (OVC)

The IEC standards class Overvoltage Categories, which are sometimes referred to as Installation Categories, as follows (most stringent to the least stringent):

Category IV

Used at the origin of the installation. Examples are utility transformers, electricity meters, fusing and distribution panels. High transient voltages are very likely.

Category III

Used in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements. These installations will have permanent connection to the distribution panel (hard wired). Wiring impedance, fuses and circuit breakers somewhat reduce the level of voltage transients.

Category II

This covers energy-consuming equipment supplied from the fixed installation. These would be items normally plugged in to a regular wall outlet or other plug in fixture requiring 115 or 230Vac. The impedance of wiring circuits further reduces transient voltages to a lower level. Outlets, lighting switches and building connections more than 10m from a Category III source are classed at a Category II.

Category I

These are circuits requiring low voltage, which limit over voltage conditions to the appropriate level, i.e. protected electronic circuits.

Each category has to withstand a different level of voltage transient depending upon the nominal input voltage as shown in Table 1

	Tolerated Transient Voltage			
Working Voltage	Category I	Category II	Category III	Category IV
150	800	1500	2,500	4,000
300	1,500	2,500	4,000	6,000
600	2,500	4,000	6,000	8,000
1,000	4,000	6,000	8,000	12,000
Source Impedance	30Ω	12Ω	2Ω	2Ω

Table 1: Tolerated transient voltage

The standard IEC 60204-1:2016 governs the safety of machinery. The general requirements apply to electrical, electronic and programmable electronic equipment that are fixed in their location. The equipment covered by this part of the standard commences at the point of connection of the supply to the electrical equipment of the machine.

An industrial robot, or material forming machine, wired to the distribution panel would need to comply with Overvoltage Category III, as shown in Figure 1. If the AC-DC power supply inside of the robot controller was only OVC II, then an isolating transformer (not necessarily a step down type) would have to be fitted inside or between the controller and the distribution panel. The impedance of the transformer would be enough to reduce the transient voltage level.

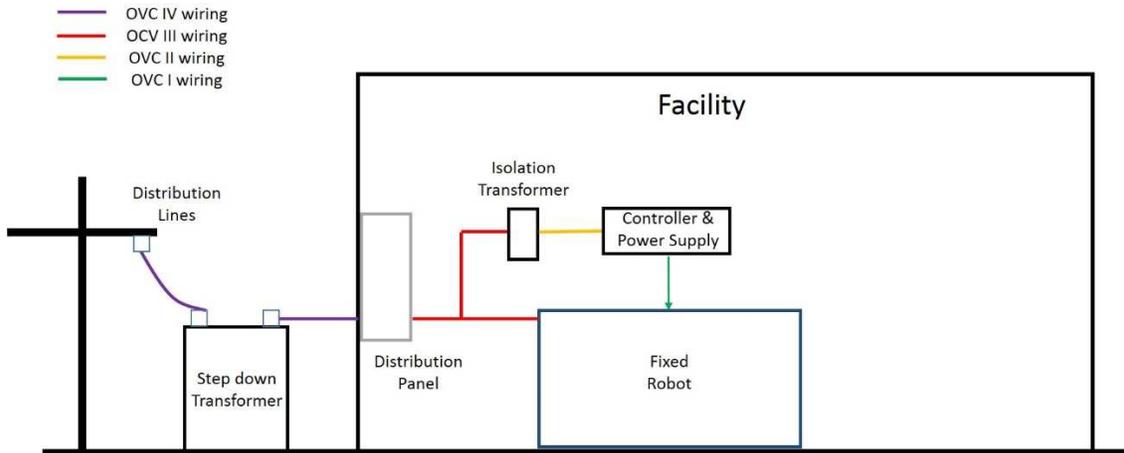


Figure 1: Levels of Overvoltage Category inside of a factory or facility

Some OVC III industrial AC-DC power supplies are available, like TDK-Lambda's 240W rated 24V output ZWS240RC-24 power supply.



Although based on TDK-Lambda's ZWS300BAF-24 which is OVC II, it has increased spacing from the Line and Neutral to ground, including additional spacing on the input connector. It is also certified to EN 62477-1 - safety requirements for power electronic converter systems and equipment. It is said to be a more suitable specification than EN 50178 which covers electronic equipment for use in power installations.

The use of such a power supply can eliminate the isolation transformer, saving both cost and space.

